Canadian Centre for Occupational Health and Safety

Centre canadien d'hygiène et de sécurité au travail

CONTACT LENSES IN THE WORKPLACE
THE PROS AND CONS

P85-1E

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250 Main Street East
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October 1985

P85-1E

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CCOHS NUMBER P85-1E

ISBN 0-660-11920-X

DSS CATALOGUE NUMBER CC273-2/85-1E

This publication is available
in both official languages.

Cette publication est disponible
dans les deux langues officielles.

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Published 1985

Additional copies available upon request.

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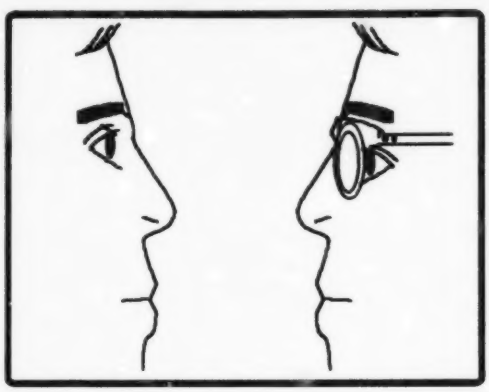
INTRODUCTION

The use of contact lenses has increased steadily in recent years, as has the concern over their safety in the workplace. Many incidents have been reported where contact lenses were purported to have worsened injuries. On the other hand, different situations have also been reported where injuries have been lessened or even prevented. Decisions about the safety of their use have often been very difficult to make because of the controversial nature of the experience in the workplace and scientific research. It is impossible to say with absolute certainty whether or not contact lenses are safety hazards in the workplace.



Contact lenses are small, thin discs made of a transparent material that is ground or shaped on the outer side to correct or improve vision, while the inner side is carefully prescribed and designed to correspond to the surface shape of the eye. Contact lenses are worn over the surface of the eyeball. They may be rigid (hard) or flexible (soft) or a variety in between.

Many people wear contact lenses because they prefer them to eye glasses for cosmetic rather than medical reasons. A few people however, must wear contact lenses for adequate vision (for example, after cataract surgery, or for medical conditions such as kerataconus--a deformity of the cornea).

Put very simply, the problem is that contact lenses complicate eye safety. Contact lenses have the potential to entrap a substance (vapour, chemical, dust) and hold it against the eye, possibly damaging the eye, conversely, some contact lenses may prevent some substances from reaching the eye, thus minimizing or even preventing an injury. Both types of situation have been documented, leading to the diversity of opinion about the safety of contact lenses in the workplace. More complete information is impossible to obtain since occupational injury reporting systems do not include information about contact lens use.

Since little theory or guidance has been available, decision makers have often resorted to treating each decision about the wearing of contact lenses as unique and to making decisions based on some unspecified combination of organizational policy and risk comparisons.

Safe work conditions for all workers, including contact lens wearers, are only possible when basic occupational health and safety principles are followed. In the case of contact lens wearers, where any risk of eye injury exists some extra precautions may be required.

An inspection of the workplace, with special attention to eye hazards as identified in Section I, is essential. When hazards are identified, the fundamental health and safety principle of elimination and/or minimization of hazards at the source (for example, substitution of new equipment, redesign of equipment, isolation of hazardous equipment, etc.), along the path to the worker (for example, local ventilation, housekeeping, etc.) and at the worker (for example, personal protective equipment and administrative controls) must be followed.

The following pages provide information to aid in identifying potential eye hazards, and we explore ways to ensure health and safety. Co-operation of everyone involved is essential because employers and employees have an essential role to play. Section VI describes some possible actions that may be taken to ensure health and safety for contact lens wearers.

The crucial point that is generally accepted is that *contact lenses are not, in themselves, protective devices.* They are not a substitute for occupational health and safety principles and procedures, which whenever indicated, must be implemented.

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I. THE EVIDENCE AGAINST THE WEARING OF CONTACT LENSES

Direct Hazards

The arguments against wearing contact lenses in the work environment are based on the following assumptions:

1. dusts or chemicals can be trapped behind the lens and cause irritation and/or damage to the cornea;
2. gases and vapours can cause irritation and excessive eye watering; and
3. chemical splash may be relatively more injurious when contact lenses are worn because the removal of the lenses may be delayed, inhibiting first aid and extending the exposure time.

Hazardous Conditions for Contact Lens Wearers

These are the conditions cited by various authors as necessitating restrictions for wearing contact lenses (1, 2, 3, 4, 5, 6, 7):

- exposure to chemical fumes and vapours,
- areas where potential for chemical splash exists,
- areas where particulate matter or dust is in the atmosphere,
- exposure to extremes of infrared rays,
- intense heat,
- dry atmosphere,
- flying particles,
- operations that require the use of respirators or personal protective hoods, and
- areas where caustic substances are handled, particularly those used or stored under pressure.

In workplaces with ultra-violet and infrared radiation sources, users of both types of contact lenses require protection just as persons not wearing contact lenses do. Both contact lens types absorb infrared radiation. This effect is potentially more harmful to the soft lens wearer as it could alter the water balance of the contact lens.

The concern about the use of contact lenses with respirators or personal protective hoods is based on the following. Dislodgement or sudden loss of a contact lens while wearing a respirator could lead to two potential problems. First, it is impossible to adjust or replace a contact lens while wearing such equipment in a hazardous environment. Secondly, the dislodged contact lens could become trapped in a part of the equipment that prevents its proper functioning.

Also, low humidity and the lower oxygen level around the eyes, which are necessitated by this equipment, adversely affects the wearing of contact lenses.

Hazards for Hard Contact Lens Wearers

Hard lenses are made from an impervious material. Increased risk may result if foreign substances such as dust, or small metal fragments, become trapped behind the contact lens. Since the contact lens floats on the tear film in front of the cornea, and is not in a fixed position, there may be an abrading action between the contact lens and the foreign substance on the cornea, which may result in injury to the cornea. Also chemicals may become trapped behind the contact lens and held in place against the cornea. In dirty, dusty environments, the wearing of hard lenses may be more hazardous than soft contact lenses.

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Hazards for Soft Contact Lens Wearers

Soft lenses are made from a type of plastic that contains a large proportion of water. Some researchers feel that the soft lens, because it adheres more tightly to the cornea and does not have as much fluid motion as the hard contact lens, offers some, but not total, protection against entrapment of foreign substances between the contact lens and the cornea.

The major risks for soft contact lens wearers are from chemical splashes and from hot, dry environments. Owing to the high water content of the soft contact lens, materials can pass through the lens and be held in place against the cornea by the proximity of the lens itself.

Hot, dry environments can lead to problems because they cause dehydration of the tear layer upon which the lens rides. This results in eye discomfort.

Associated Hazards

A contact lens wearer working alone or in a remote area may be at greater risk if incapacitated due to an eye injury. The immediate removal of contact lenses in such a situation may be important and the wearer may be unable to do this. Also, qualified staff and equipment (for example, eyewash stations) may not be immediately available, magnifying the risk of further damage.

Dislodgement or sudden loss of a contact lens is another problem. There are two complications to the sudden loss or displacement of contact lenses. The first complication creates sudden changes in vision quality due to decreased visual acuity and blurring. These pose obvious dangers if dislodgement should occur at a moment when sight is essential for safety. The same problems could occur for wearers of glasses, though contact lenses are more easily lost and more difficult to re-position. The second complication is a condition known as 'spectacle blur'. This is an extended period of decreased vision that occurs after contact lenses are removed (12). This condition is of greatest concern for the wearers of hard contact lenses.

II. THE EVIDENCE FOR THE WEARING OF CONTACT LENSES

Several authors feel that, in most work environments, contact lenses will not create excessive risk and "if worn with proper eye protection devices, contact lenses are as safe as eyeglasses on most industrial jobs" (10).

Some even feel that contact lenses give added eye protection and help to minimize injury. A study by Guthrie and Seitz (11) on chemical splashes and contact lens wearing supports this opinion. From reactions in three test rabbits, they concluded that the contact lens acted as a barrier to the irritant on the cornea. They postulated that eyelid spasm occurs, causing the lens to be tightened against the cornea, thereby effectively sealing off the area under the lens. While valuable information was gained from the study, generalizations about the safety of contact lenses in the workplace could not be made. Guthrie and Seitz acknowledged that more research was needed.

There have been a number of papers published that describe situations where contact lenses either served as protective devices or did not increase injury from accidents (12, 13, 15, 16, 17).

The Canada Safety Council (14) states,

"When performing functions requiring eye protection, and suitably protected, the contact lens wearer may be given equal consideration to that given any person with normal sight. The contact lenses are not a handicap, in fact, there may be some areas where the wearer has a distinct advantage over fellow workers wearing spectacles. The Canada Safety Council has learned of no adequately documented proof that use of contact lenses on the job presents any hazard."

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III. A SPECIAL CASE : CONTACT LENSES AND WELDING

For many years reports have surfaced and resurfaced in one form or another that exposure of contact lens wearers to electric arc flashes, or sparks from the welding process, can cause eye injury and even blindness. Most recently it was alleged that workers exposed to welding arcs had suffered eye injury, resulting from drying of fluid between the eye and the contact lens, which caused the contact lens to be bonded to the cornea. When the contact lenses were removed, it was claimed, the cornea was damaged. The hypothesis was that the contact lenses caused the injury by concentrating rays or heat from the arc. According to the Ontario Association of Optometrists (18), Construction Safety Association of Ontario, American Optometric Association, and many other groups, such an incident could not have happened. According to the basic laws of physics, it is impossible (19). Heat from a welding arc or electrical spark is not intense enough to dry up the eye's tear fluid. Nor could a contact lens concentrate rays to intensify the heat.

All workers in proximity to welding procedures must wear appropriate eye protection, whether they are using contact lenses or not.

IV. LEGAL REQUIREMENTS

The only Canadian jurisdiction that has legislated on the subject of wearing contact lenses is British Columbia. Their Industrial Health and Safety Regulation (Sec. 14.21) states (9):

"Prohibition of contact lenses

(4) No worker shall wear contact lenses where:
(a) gases, vapours, or other materials are present which, when absorbed by contact lenses, may harm the eyes, or;
(b) dusts or other materials are present which may harm the eyes or cause distraction which may expose the worker to other injury".

The U.S. Occupational Safety and Health Administration (OSHA, Section 1910.134) has prohibited the wearing of contact lenses with any respirator, as has California (CalOSHA : GISO 5144(h)).

The NIOSH/OSHA Pocket Guide to Chemical Hazards (8) recommends that contact lenses should not be worn when working with a list of several hundred chemicals.

V. IDENTIFICATION AND CONTROL OF EYE HAZARDS

To ensure the safe use of contact lenses in the work environment, occupational health and safety principles must be applied to identify and control possible hazards.

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A. Identification of Hazards.

In Section I the most common hazards to contact lens wearers have been discussed. Quantification of hazards is difficult and a variety of complex approaches have been developed. However, the most useful way of evaluating the risk is to classify it as either acceptable or not acceptable.

If the risks of wearing contact lenses in a particular environment are found to be within acceptable limits, then the only course of action needed is ongoing monitoring of the situation.

If the risks are found to be unacceptable, then further action is required to eliminate existing hazards or to reduce hazards to acceptable levels.

In any event, if the steps outlined here are followed, then the health and safety of all workers will be improved.

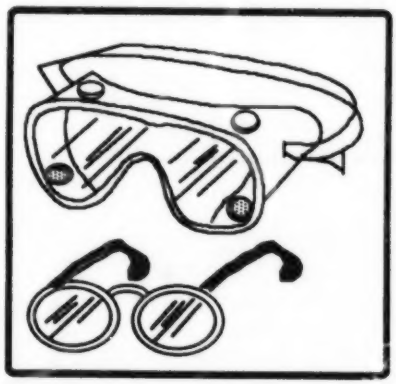
B. Elimination or Reduction of Hazards Through Engineering Controls.

In any workplace the priority should be the elimination and control of hazards at their source or along the path between the source and the worker. In many instances occupational health and safety law requires such action.

Many methods are available, and those most applicable to the specific situation should be used. Controlling a hazard at its source either eliminates it from the workplace altogether or isolates it from the worker. This 'safe place' approach may require the purchase of new equipment, substitution with a non-hazardous substance, isolation of the hazard, addition of safety features to existing equipment, or redesign of the work process.

Controls along the path between the source of the hazard and the worker include ventilation; wet or other methods for control of dusty operations; machine guarding; and barriers or screens.

C. Selection and Provision of Adequate Personal Protective Equipment.



When the hazard cannot be controlled adequately, personal protective equipment (PPE) of some form will be required. When contact lenses are worn and where a hazard exists, extra precautions are required to reduce the potential for injury. As previously stated, contact lenses are not in themselves protective devices. Personal protective equipment for contact lens wearers include splash or dust resistant goggles, and safety glasses. A combination of types of personal protective equipment may be necessary if more than one type of hazard exists. For example, where chemical splashes and flying objects are potential hazards, chemical splash goggles used in combination with safety glasses may be required. Recently, devices that protect against more than one type of hazard have become available (for example, impact resistant goggles which also protect against dust and chemical splash).

D. Administrative Controls.

Where all methods of eliminating and reducing hazards have been explored, and where the PPE cannot adequately protect the wearer, or where the worker is unable or unwilling to wear the PPE prescribed, two administrative options exist. In a few cases, either the contact lenses should not be used (and eye glasses used instead) or in rare cases the worker may be offered alternate work.

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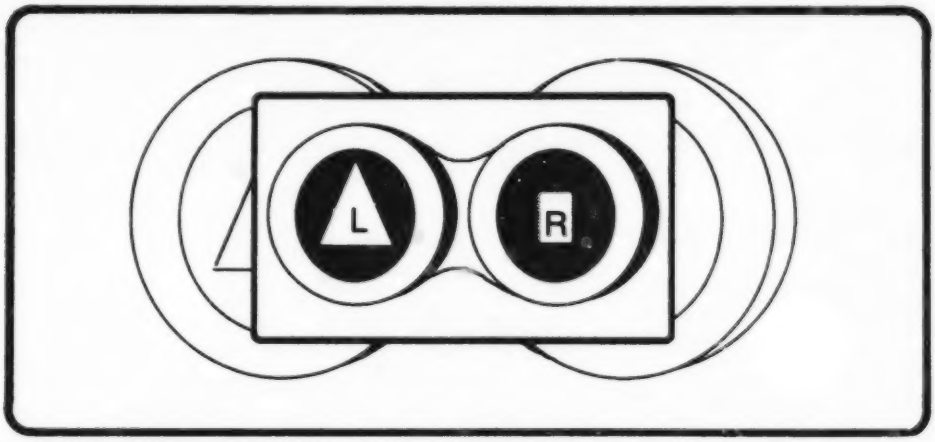
VI. EYE PROTECTION FOR USERS OF CONTACT LENSES

The employer and the worker have responsibilities to ensure the safe use of contact lenses. Where contact lenses are worn, the following steps should be followed.

A) Employer

1. Ensure that the health and safety principles described in Section V are followed.
2. Provide training and education about eye hazards, particularly those specific to contact lens' use.
3. Clearly identify contact lens wearers.
   It is important that workers wearing contact lenses, for whatever reason, be clearly identified. To expedite the implementation and enforcement of an eye protection program Medic-Alert insignia is helpful.
4. Have personnel available who are knowledgeable in the removal of contact lenses in case of emergency.
   In the event that the wearer is required to remove the contact lenses, personnel should be available to provide assistance. Removal may be critical to prevent further injury. In some situations an ophthalmologist may be required to remove contact lenses.
5. Provide access to a clean place for regular maintenance and periodic cleaning of PPE and contact lenses (for example, removal of dust particles).



B) Worker

1. Take special care to keep contact lenses clean. Follow the advice of your doctor.
2. Make sure that fellow employees and the employer know that you are wearing contact lenses.
3. Be alert for changes to the work process and changes to environmental conditions that may be hazardous to you.
4. Keep eye glasses available for unforseen circumstances.
5. Wear personal protective equipment whenever required.
6. Learn about eye hazards and encourage your employer to do the same.

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VII. CONCLUSION

The safety of wearing contact lenses under some conditions cannot be ascertained from the scientific literature. The approach in this document has been to provide information to aid in the decision-making process that must be followed to minimize the risk for eye injury for all workers, with particular attention to contact lens wearers. A genuine effort to identify eye hazards is essential so that they may be eliminated or reduced at the source-the best choice of action. Elimination or reduction through personal protective equipment may also be indicated. In almost all workplace these steps should be adequate in making the risks for contact lens wearers acceptable.

A universal ban of contact lenses in the workplace is unwarranted. The British Columbia regulations might be considered as a model that provides a realistic solution.

In the few cases where the risk and the means of hazard control are unacceptable, the last option should be considered--either the contact lenses should not be used or, if this is not possible or acceptable, the wearer should be provided alternate work where the hazards are absent or less. If all other steps are followed, the last will be rarely resorted to.

While scientific information on the issue of contact lenses continues to be sketchy, decisions on safety will remain difficult. The information provided here will assist in making decisions about the safe use of contact lenses. It is hoped that scientific information on the health and safety of contact lenses will improve in the future.

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